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(19)

(54) EDIBLE PRODUCTS

(71) We, UNILEVER LIMITED, a company organised under the laws of Great Britain, of Unilever House, Blackfriars, London E.C.4, England, formerly of Port Sunlight, Wirral, Cheshire, England, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to food products and in particular to food products having a non-uniform texture simulating that of soft fruits such as blackcurrents and redcurrents in which a relatively tough skin surrounds an interior which because it is liquid or plastic (i.e. flow readily under slight pressure) is soft.

According to the invention such a food product comprises fruit pulp or puree encapsulated in a skin of calcium or aluminium alginate or pectate gel.

The fruit pulp or puree may contain a thickening agent, preferably a water soluble cellulose derivative such as carboxymethyl cellulose.

Food products in accordance with the invention can be prepared by incorporating dissolved calcium or aluminium ions in the fruit material to be encapsulated and bringing the fruit material in the form of drops or like small portions into contact with an alginate or pectate sol. At the interface of the drops and the sol, there is thus formed an enveloping skin of calcium or aluminium alginate or pectate gel. The skin of gel quickly thickens and becomes substantially impenetrable by the sol so that interaction of sol with the dissolved calcium or aluminium ions in the interior of the drops cannot take place.

The fruit material to be encapsulated is preferably contacted with the alginate or pectate sol by releasing drops of the fruit material into a stream of the sol. The drops are carried away suspended in the stream and can be recovered downstream in encapsulated form at a point (corresponding generally to an immersion time of 0.5 to 5 minutes) at which a skin of gel has formed to a desired thickness on the drops; the sol can then be recirculated. The surfaces of the recovered capsules will usually be rather sticky owing to the excess sol adhering to them and it may accordingly be desirable to gel the sol at the surfaces by treatment with a solution of an edible calcium or aluminium salt which salt is conveniently the same as that used as a means of incorporating dissolved calcium or aluminium ions in the fruit material subjected to the encapsulation procedure.

Of the salts those of calcium are preferred; examples are calcium lactate, citrate, gluconate, tartarate and acetate. If an aluminium salt is used, it may be for example be aluminium sulphate or one of the edible alums such as potassium alum. A suitable concentration of dissolved calcium or aluminium salt, whether incorporated in the fruit material to be encapsulated or in the solution used during the treatment to counteract stickiness in the capsule formed, is in the range 0.5 to 2% by weight.

The alginate or pectate sol employed is suitably one based on an alkali metal alginate or pectate for example sodium alginate, ammonium alginate or sodium pectate. The preferred concentration of alginate or pectate in the sol is 1 to 2% by weight.

Suitable fruit materials for encapsulation include the pulp or puree of blackcurrents, strawberries, apples, pears and peaches. The puree may be a fruit juice thickened to a viscosity that corresponds to the texture desired for the interior of the fruit. The fruit pulp or puree, particularly the relatively bland material such as apple may have additional flavouring incorporated in them, the flavouring not necessarily corresponding to the fruit of the pulp or puree itself. Thus apple pulp may be flavoured with blackcurrent flavouring and encapsulated to form artificial fruit simulating blackcurrents in both taste and texture. On the other hand as

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illustrated in Example 2 later in this specification strawberry pulp or puree can be encapsulated to form artificial fruit with a texture simulating that of blackcurrants but with a taste of strawberries.

The simulated fruits of the invention may if desired contain additional colouring matter. If an edible dyestuff is included in the alginate or pectate sol used to form the fruits, then the fruit formed with have a coloured skin whereas if the dye stuff is included in the edible material to be encapsulated, then the interior of the fruit will be coloured.

The skin of alginate or pectate gel on the simulated fruits can behave as a semi-permeable membrane and when the fruit is stored in an aqueous environment low in dissolved salts, it tends to absorb water and swell. On swelling it develops a texture which, with regard to the sensation it gives on being bitten into, very much resembles that of natural fruit.

The presence of too watery a texture in the interior of the fruit may be avoided by including a thickener in the fruit material to be encapsulated. The thickener used may with advantage be one whose thickening properties develop only after it has been heated. A suitable thickener of this type is a cross linked starch. By the use of such a thickener one avoids making the fruit material so viscous that drops cannot easily be formed from it while enabling the simulated fruit to develop a desired consistency after the heating entailed in canning or pasteurising. Such a thickener may if desired be used in conjunction with an ordinary cold-acting thickener such as carboxymethyl cellulose or a pregelatinised starch to help get a desired viscosity in both the material to be encapsulated and in the simulated fruit formed from it.

The accompanying drawing is a dragram of a form of apparatus suitable for preparing simulated fruit according to the invention.

A reservoir 1 for the material to be encapsulated is connected by a tube 2 to a peristaltic pump 3. A tube 4 emerges from the pump and terminates in a nozzle 5 (diameter suitably 1 to 3 mm) positioned in the wide mouth portion of the helical tube 6. An inlet pipe 7 for the alginate or pectate sol enters the wide mounth of the helical tube 6. Just below the outlet of the helical tube is a fine mesh screen 8 under which is a reservoir 9 for sol passing through the screen.

The reservoir is connected to the inlet pipe 7 via a pump 10. At the lower end of the screen 8 is a bath 11 which contains a setting solution of calcium or aluminium salt.

In operation the material to be encapsulated is pumped from the reservoir 1 and issues from the nozzle 5 in the form of drops which fall into the alginate or pectate sol flowing from inlet pipe 7 down the inclined base of the wide mouth of helical tube 6. The drops are carried by the sol as it flows into and through the main body of the helical tube. When the drops released from nozzle 5 first come into contact with the sol, between the sol and the dissolved calcium or aluminium ions incorporated in the material to be encapsulated leads to formulation of a thin enveloping skin of gelled alginate or pectate sol at the surface of the drops. The skin becomes thicker as the drops pass along the tube 6 in suspension in the sol. At the outlet of the tube 6 the sol containing the suspended encapsulated material falls onto the screen 8 which retains the capsules but allows the sol to pass through the reservoir 9 for recirculation to inlet pipe 7. An air blower may be used to blow excess sol from the surface of the capsules while they are on the screen. The encapsulated material rolls down the screen 8 into the setting bath 11 from which, after a few minutes immersion it can be recovered and drained free from adhering edible calcium or aluminium salt solution.

The invention is further illustrated by the following Examples.

EXAMPLE 1

This Example illustrates the preparation from blackcurrant pulp of simulated blackcurrants having a skin of calcium alginate gel resembling the skin of real blackcurrants and having a blackcurrant fruit interior and suitable for incorporation in manufactured products such as yoghurt, pie filling and jam.

A viscous blackcurrant pulp mix containing calcium ions was prepared by mixing together the following ingredients

	% by weight
blackcurrant pulp	41.1
water	42.8
calcium lactate	1.0
citric acid	0.175
sugar	12.7
cross linked farina	1.7
carboxymethyl cellulose	0.5

This mix was put into the reservoir 1 of the appartatus illustrated in the drawing and an alginate sol containing 2% by weight of sodium alginate and adjusted to pH 4 by citric acid was made to circulate through the helical tube of the apparatus. The mix of blackcurrant pulp was then pumped to the nozzle 5 and the drops of it that fell into the alginate sol became encapsulated and were carried through the helical tube by the sol. They were duly separated from the alginate sol by the screen 8 having been in contact with the alginate sol for about 1 minute. At this point (before rolling down into setting bath 11) a skin strong enough to withstand handling had formed on the drops but this skin was rather sticky from superficial ungelled sol. Stickiness

was not apparent in the capsules collected from seting bath 11 containing a 2% by weight solution of calcium lactate in water.

Some of the artificial blackcurrants were incorporated in yoghurt by stirring to form a product not easily distinguishable from a yoghurt containing real blackcurrants.

Others of the artificial blackcurrants were canned in an aqueous syrup and heated at 100°C for 30 minutes to render them sterile. When the can was opened the interior of the blackcurrants proved to have a thicker texture than before canning owing to the action of heat on the cross linked starch. The texture of the blackcurrants after canning and sterilisation resembled the texture of real blackcurrants even more closely than before canning.

A further sample of the artificial blackcurrants was air dried in a vacuum oven at 70°C for 90 minutes. The dried artificial blackcurrants were then incorporated together with sugar, pectin, starch and dried blackcurrant puree in a dried pie filling which could be rehydrated to a product which closely resembles a pie filling prepared from natural fruit.

EXAMPLE 2

The procedure of Example 1 was followed using the same ingredients except that the blackcurrant pulp was replaced by strawberry pulp. The capsules of artificial fruit produced had the texture of blackcurrants and the taste of strawberries. When incorporated in yoghurt they imparted to it not only a pleasant strawberry taste but also a pleasant texture.

WHAT WE CLAIM IS:—

1. A food product having a non-uniform texture simulating that of soft fruits which comprises fruit pulp or puree encapsulated in a skin of calcium of aluminium alginate or pectate gel.

2. A food product according to Claim 1 in which the fruit pulp or puree contains a thickening agent.

3. A food product according to Claim 2 in which the thickening agent is a water soluble cellulose derivative.

4. A food product according to any one of Claims 1 to 3 in which the fruit material is blackcurrant pulp or puree.

5. A food product according to any one of Claims 1 to 3 in which the fruit material is strawberry pulp or puree.

6. A method of preparing a food product as defined in Claim 1 in which fruit pulp or puree incorporating dissolved calcium or aluminium ions is brought in the form of drops into contact with an alginate or pectate sol.

7. A method according to Claim 6 in which drops of the fruit pulp or puree are released into a stream of the sol.

8. A method according to Claim 6 or Claim 7 in which excess alginate or pectate sol on the surface of the encapsulated drops is gelled by treatment with a solution of an edible calcium or aluminium salt.

9. A method according to any one of Claims 6 to 8 in which the sol is a sodium alginate sol.

10. A method according to any one of Claims 6 to 9 in which the fruit pulp or puree contains a thickener.

11. A method according to Claim 10 in which the thickener is a water soluble cellulose derivative.

12. A method of preparing a food product having a non-uniform texture simulating that of soft fruits substantially as described in either one of the Examples.

13. Food products when prepared by a method according to any one of Claims 6 to 12.

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1302275 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale